

# Environmental Best Management Practices for Fleet Maintenance

MARLYN AGUILAR  
DEPARTMENT OF HEALTH

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## EPA Region 9 Vehicle Maintenance P2 Initiative

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- **Extensive literature review**
- **National Advisory Group**
- **Volunteer facilities**
- **In-shop evaluations**
- **Fact sheets, videos, workshops**

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## **Fleet Maintenance Environmental Issues**

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- Different operations have different waste streams and media
  - Parts cleaning - Spray bottles
  - Brake washing - Oil filters
  - Used oil - Antifreeze
- Alternatives to reduce cost, liability, improve worker safety

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## **Fleet Maintenance P2 Topics**

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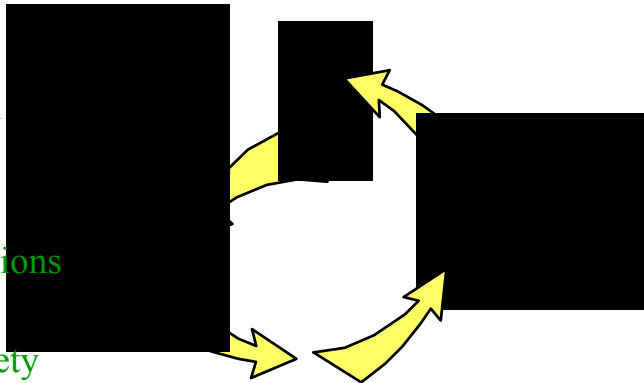
- Aqueous Cleaning
- Aqueous Brake Washing
- Refillable Spray Bottles
- Reusable Oil Filters
- Engine Oil Life Extension
- Antifreeze Recycling
- Spill Prevention and Floor Cleanup
- Oil/Water Separator

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## Parts Cleaning

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- Pro's
  - Cleans well
  - Turnkey
- Con's
  - VOC emissions
  - Haz waste
  - Worker safety
  - Need-it-or-not servicing



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## P2 Alternatives- Aqueous Cleaners

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- Spray Cabinet-Heavy duty/saves labor
- Microbial Sink-Top – Light Duty
- Ultrasonic Unit – Transmission/Carburetors
- Immersion Unit – When soaking needed

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## **World Airports Fleet Maintenance Facility Conversion (Los Angeles)**

<b>From</b>		<b>To</b>
<b>(Existing Aqueous Units)</b>		<b>(Alternative Aqueous Units)</b>
6 sink-top units	→	4 sink-top units
<u>4 immersion units</u>	→	<u>7 spray cabinet</u>
<b>Total = 10 aqueous units</b>		<b>5 aqueous units</b>

**Current Annual Cost = \$31,951**

**Modified Annual Cost = \$18,884**

**Annual Savings = \$13,068**

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## **Baseline: Solvent Brake Washing**

**Option 1: Aerosol cans of brake cleaner**

**Option 2: Roll-up solvent washers**

**Environmental Concerns**

- Solvent emissions cause smog formation
- Spent solvents are hazardous waste
- Aerosol product use increases worker exposure
- Empty aerosol cans - bulky, nonbiodegradeable waste
- Solvent-contaminated rags

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## P2 Alternative: Aqueous Brake Cleaning

- Avoid final shot of aerosol brake cleaner
- Use compressed air for drying
- Consider units that adjust in height



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## Typical Scenario

- > 20 brake jobs / month
- Payback < 2 years
- Assumptions
  - Aerosol brake cleaner    \$2 / can  
            **1 can / job**
  - Aqueous unit                                 \$800
  - Disposal: solution and filters          \$30 /  
            year

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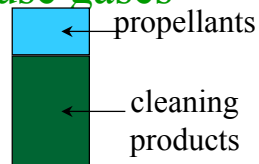
## Baseline: Disposable Aerosol Cans



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## Environmental Concerns

- Propellants are greenhouse gases
  - CO<sub>2</sub>, propane, butane
- Empty cans
- Partially-filled cans



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## P2 Alternative: Refillable Bottles

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- Metal Bottles: pressurized with shop air
- Plastic Bottles: pressurized with hand



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## Payback Threshold

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If you use 20 aerosol cans per month or more:  
Payback < 1 year and annual savings = \$250

- 1) A shop uses 13-fluid oz. of aerosol cans at a cost of \$2 per can
- 2) No disposal costs
- 3) 5 refillable spray bottles are purchased at \$50 each
- 4) Bulk product costs \$10 per gallon

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## Baseline: Throw-Away Filters

- U.S. businesses discard over 400 million used oil filters every year
- Even after crushing, these filters contain about 3 million gallons of oil
- Fleet facilities incur costs to
  - maintain inventory
  - manage & dispose of used oil filters



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## P2 Alternative: Reusable Oil Filter



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## Purchasing and Use

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- Commonly used for large vehicles such as trucks and vans
- Adapter plate varies to fit engine types and filter inserts vary according to vehicle size
- Wire cloth filter must be cleaned in parts washer (5 – 15 minute job)

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## Oil Change

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Need-it-or-not changes based on:

- Mileage
- Calendar
- Operating Time



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## Environmental Concerns

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- 2.7 billion gallons of oil are sold annually
- 50% of oil is consumed and 50% is used oil
  - 31% of this “used oil” is never recycled!
- Used oil can be burned for energy or re-refined
- Burning oil results in air pollution
  - sulfur emissions
  - hydrocarbon pollutants
- 3 to 5% of used oil that is re-refined ends up as hazardous waste sludge

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## P2 Alternative: Oil Life Extension

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- Successful program needs two elements:
  - Good baseline data
  - Regular sampling
    - **Does not require much extra labor**
    - **Collect during scheduled maintenance**

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## Case Study 2: Hickam AFB

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- Fleet = 659 vehicles (trucks, vans, and cars)
- Test on-site with CSI #5100, previously used LubriSensor
- 45 samples per month tested for silica, metals, ferrous materials, and water
- Oil change interval doubled
- Oil disposal and purchase reduced by 46%
- Payback: 1 1/2 years

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## Antifreeze Environmental Concerns

1. Ethylene glycol (the main ingredient in antifreeze) is toxic chemical (SARA Title III Section 313)
2. May contain heavy metals such as lead, cadmium, chromium, iron, copper, and zinc
3. Ethylene glycol is manufactured from nonrenewable resources

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## Warranty Issues To Consider

- ✓ Some vehicle manufacturers certify technologies
- ✓ Some antifreeze recycling unit vendors certify recycled antifreeze
- ✓ Most vendors claim recycled antifreeze quality is better than virgin antifreeze
- ✓ ASTM standard for recycled antifreeze for automotive and light duty engines will level the field

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## Case Study - USPS Huntington Beach

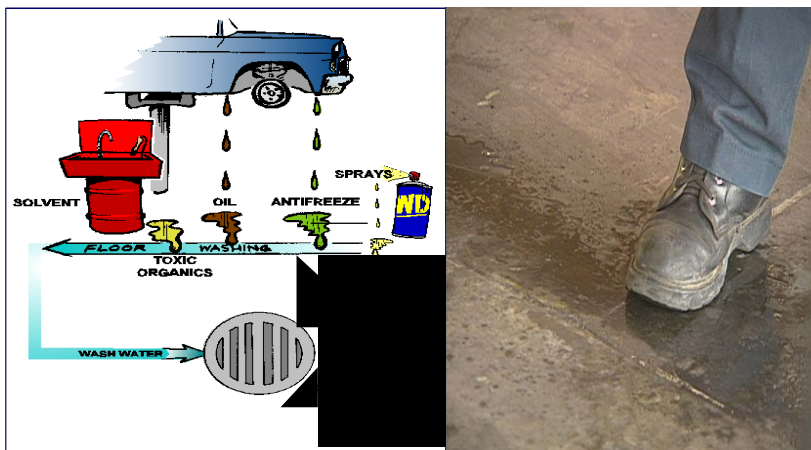
- 1,030 vehicles
  - 70 – 100 coolant changes/month
  - 2,250 gallons waste coolant/year
  - \$18,900/year antifreeze purchase and disposal
- Antifreeze recycling
  - Batch distillation unit: \$8,500
  - Additives, O&M: \$4,310/year



Payback Period: < 7 months

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## Safety Hazards and Contaminated Wash Water



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## Environmental Concerns

- Sanitary sewer discharges
  - metals in treatment sludge
  - “pass through” contaminants
- Storm drains discharge directly to surface water
- Dry well discharges can contaminate groundwater

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## P2: Use Roll-Around Drip Pans



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## P2: Use Sloped Drum Covers



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## P2: Secondary Containment

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## P2: Overhead Bulk Delivery

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## P2 Alternative: Dry Shop

- Use dry clean up methods
- Use launderable rags for small spills
- Segregate spill wastes (4-step method)
- Use absorbents sparingly
- Epoxy-seal floor to reduce cleaning needs

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## Four-Step Floor Cleanup



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## Making It Work

### Minimize Absorbents

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- Disadvantages:
  - Spilled oil and antifreeze cannot be recovered
  - Must be purchased repeatedly
  - May be a hazardous waste
  - Contaminants may be released to environment
- Reserve absorbents for large spills and emergencies
- Where possible, use reusable pads and pigs

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## Making It Work

### Power Washing

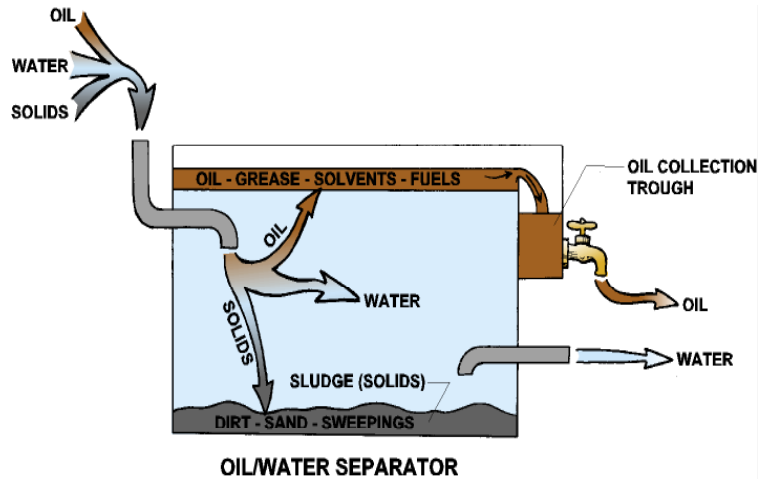
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- Is wash water properly disposed?
- Even if a contractor power washes the floor, you can be held liable for illegal disposal.



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## Baseline: OWS, What OWS?



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## P2 Alternative: OWS BMPs

### MINIMIZE

- Solids: sediments, trash, sand
- Contaminants: antifreeze, fuel, solvents, paint
- Wastewater, storm water, wash water

### INSPECT

### BIOREMEDIATION

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## Case Study 2: USPS

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### Huntington Beach, CA

- Discharge violations
- 80% reduction of **effluent hydrocarbons with bioremediation**

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